State of Louisiana
Department of Natural Resources
Coastal Restoration Division and
Coastal Engineering Division

2005 Operations, Maintenance, and Monitoring Report

for

Sabine Refuge Protection

State Project Number CS-18
Priority Project List 1

June, 2005
Cameron Parish

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2005 Operations, Maintenance, and Monitoring Report
for
Sabine Refuge Protection (CS-18)

Table of Contents

Preface

The Operations, Maintenance, and Monitoring (OM&M) Report format is a streamlined approach which combines the Operations and Maintenance annual project inspection information with the Monitoring data and analyses on a project-specific basis. This report includes monitoring data collected through December 2004, and annual Maintenance Inspections through June 2005.

The 2005 report is the second in a series of reports. For additional information on lessons learned, recommendations and project effectiveness, please refer to the 2004 Operations, Maintenance, and Monitoring Report on the Louisiana Department of Natural Resources (LDNR) web site at dnr.louisiana.gov (Sharp and Guidry 2007).

I. Introduction

The project is located approximately 20 mi (32 km) west-southwest of Hackberry, Louisiana (figure 1), on the east levee of the Burton-Sutton Canal (BSC) adjacent to the Sabine National Wildlife Refuge Impoundment 3, a 27,000 ac (10,927 ha) freshwater impoundment that provides habitat for freshwater game fish, alligator, furbearers, and migratory and resident waterfowl. The impoundment supports freshwater vegetation including *Zizaniopsis aquatica* (giant cutgrass) and *Nelumbo lutea* (American lotus). The existing west levee along Impoundment 3, which was constructed in 1951, had deteriorated due to boat wake erosion and subsequent sloughing of levee material into the BSC. Continued erosion would result in multiple breaches of the levee, allowing higher salinity waters from the Calcasieu Ship Channel and Sabine Lake to enter the impoundment via the BSC. Since much of the freshwater marsh within the impoundment is highly organic and floating, saltwater intrusion and increased tidal exchange would likely convert as much as 13,000 ac (5,261 ha) of the impoundment to shallow open water (LCWCRTF 1998; USFWS 1991). The loss of floating and submerged vegetation would result in greater wind-induced wave erosion of the remaining marsh within the impoundment.

To prevent further bank erosion, 5.5 mi (8.9 km) of free-standing rock breakwater was constructed on the canal side of the east levee of the BSC (figure 1), and in January 1995 the levee was restored where it had been degraded, using dredge material from the canal.

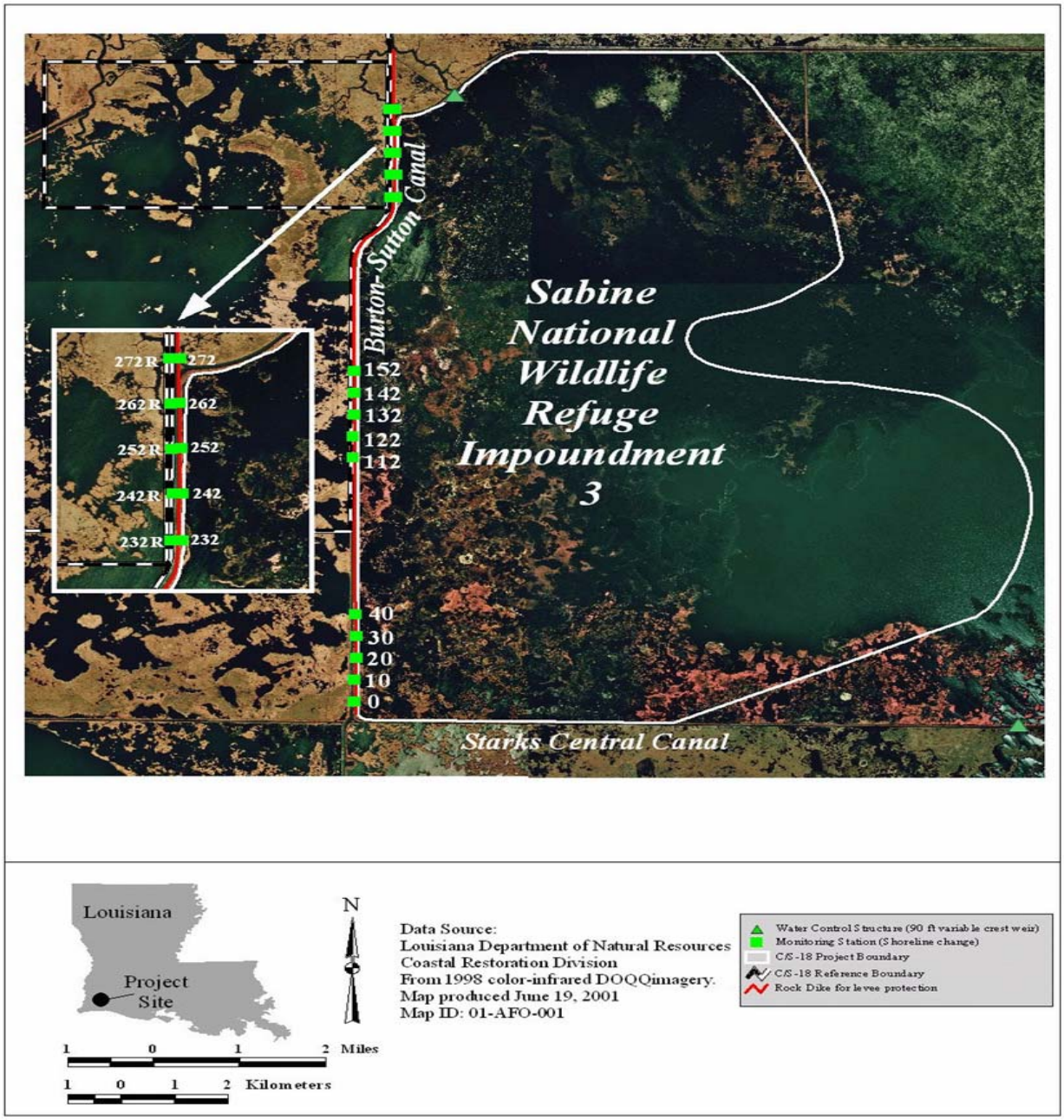

Figure 1. Sabine Refuge Protection (CS-18) project boundary, reference boundary, rock dike along the Burton-Sutton Canal, and shoreline change monitoring station locations.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Sabine Refuge Protection Project (CS-18) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, LDNR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs. The annual inspection report also contains a summary of maintenance projects which were completed since completion of constructed project features and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. Photographs taken as part of the inspection are presented in Appendix A. The three-year projected operation and maintenance budget is shown in Appendix B.

An inspection of the Sabine Refuge Protection Project (CS-18) was held on April 21, 2005, under partly cloudy skies and mild temperatures. In attendance were Stan Aucoin, Dewey Billodeau, and Darrell Pontiff from LDNR. Representatives from the U.S. Fish and Wildlife Service (USFWS) were invited but chose not to attend. The inspection began on the south end of the foreshore dike on the Burton-Sutton Canal.

The field inspection included a complete visual inspection of the entire project site. Staff gauge readings and existing temporary benchmarks were used to determine approximate elevations of water, rock weirs, earthen embankments, steel bulkhead structures, and other project features. Photographs were taken (see Appendix A) and field inspection notes were completed in the field to record measurements and deficiencies (see Appendix C).

b. Inspection Results

Foreshore Rock Dike (Burton Sutton & Starks Central Canals)

The dikes are in excellent post construction condition. No need for any maintenance in the foreseeable future. (Photos: Appendix A, Photos 1–2.)

Reinforcement of wingwalls at 3 water control structures

Excellent condition. No maintenance required at this time. (Photos: Appendix A, Photos 3-4.)

II. Maintenance Activity (continued)

Alligator crossings

Only one definite alligator crossing, and possibly two, were found. Airboats were using the crossing on the Beach Canal. Since the other crossings were indistinguishable from the surrounding levee, it is assumed that the alligators are no longer using them.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None

ii. Programmatic/ Routine Repairs

None

d. Maintenance History

There has been no required maintenance on this project.

III. Operation Activity

a. Operation Plan

There are no water control structures associated with this project, therefore no Structural Operation Plan is required.

b. Actual Operations

There are no water control structures associated with this project, therefore no required structural operations.

IV. Monitoring Activity

Pursuant to a Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Task Force decision on August 14, 2003, to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the CS-18 Monitoring Plan to merge it with CRMS-*Wetlands* and provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act.

a. Monitoring Goals

The objective of the Sabine Refuge Protection Project is to protect the existing freshwater vegetation within Impoundment 3 of the Sabine National Wildlife Refuge (SNWR) adjacent to the Burton-Sutton Canal (BSC), and to prevent the encroachment of the BSC into the impoundment.

The following goals will contribute to the evaluation of the above objective:

1. Restore and protect the west levee of Impoundment 3 using dredge material and a free-standing rock breakwater.

2. Protect existing freshwater vegetation in Impoundment 3 from saltwater intrusion via the BSC.

b. Monitoring Elements

Aerial Photography:

Near-vertical color-infrared aerial photography (1:24,000 scale) was used to measure vegetated and non-vegetated areas for the project and reference areas. The photography was obtained on November 1, 1993, prior to construction, and on January 7, 1997, 2 years following project construction. The original photography was checked for flight accuracy, color correctness, and clarity, and was subsequently archived. Aerial photography was scanned, mosaicked, and georectified by U.S. Geological Survey/National Wetlands Research Center (USGS/NWRC) personnel according to standard operating procedures (Steyer et al. 1995, revised 2000).

Shoreline Change:

To document shoreline movement, shoreline markers were placed on the vegetated marsh edge along the east bank of the BSC (and in a reference area along the west bank of the BSC, opposite the northernmost mile of the rock dike) adjacent to the northernmost, central, and southernmost miles of the rock dike, at 1,000-ft (305-m) intervals. Shoreline position relative to the shoreline markers was documented by direct measurement in 1995 (pre-construction), and post-construction in 2000. No additional shoreline data will be collected. Future inspections of the project area by

LDNR Coastal Engineering Division (CED) engineers will be conducted at regular intervals to document the condition of the rock breakwater and any required maintenance.

IV. Monitoring Activity (continued)

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Land to water ratios in the project area were 51.8% land to 48.2% water pre-construction in 1993 and 45.9% land to 54.1% water in 1997 post-construction. In the reference area in 1993, ratios were 38.5% land to 61.5% water and in 1997, ratios were 37.9% land to 62.1% water. It was determined that the 1997 post-construction aerial photography was flown when water levels in Impoundment 3 were much higher than during pre-construction photography (1993). Because the reference area is not impounded, water levels were lower than in the impoundment, and land to water ratios did not reflect those in the project area. The land loss in Impoundment 3 (figures 2 and 3) is not as high as it appears. Field observations suggest that little or no land loss has occurred.

Shoreline Change:

Shoreline survey results, presented in figure 4, show shoreline position change during the study period differing by less than 7.8 ft (2.4 m) at any one station for both the project and reference areas. Shoreline advance was detected at all project stations except stations 30 and 112 and for all reference stations except 252R during the period between 1995 and 2000 (figure 5). Mean shoreline advance rates were calculated to be 1.3 + 1.1 ft/yr (0.4 + 0.3 m/yr) and 0.9 +1.9 ft/yr (0.3 + 0.6 m/yr) for the project and reference areas, respectively. The results of the two-sample t-test indicated that there was no significant difference in shoreline change rate detected between the project and reference areas ($P = 0.90$).

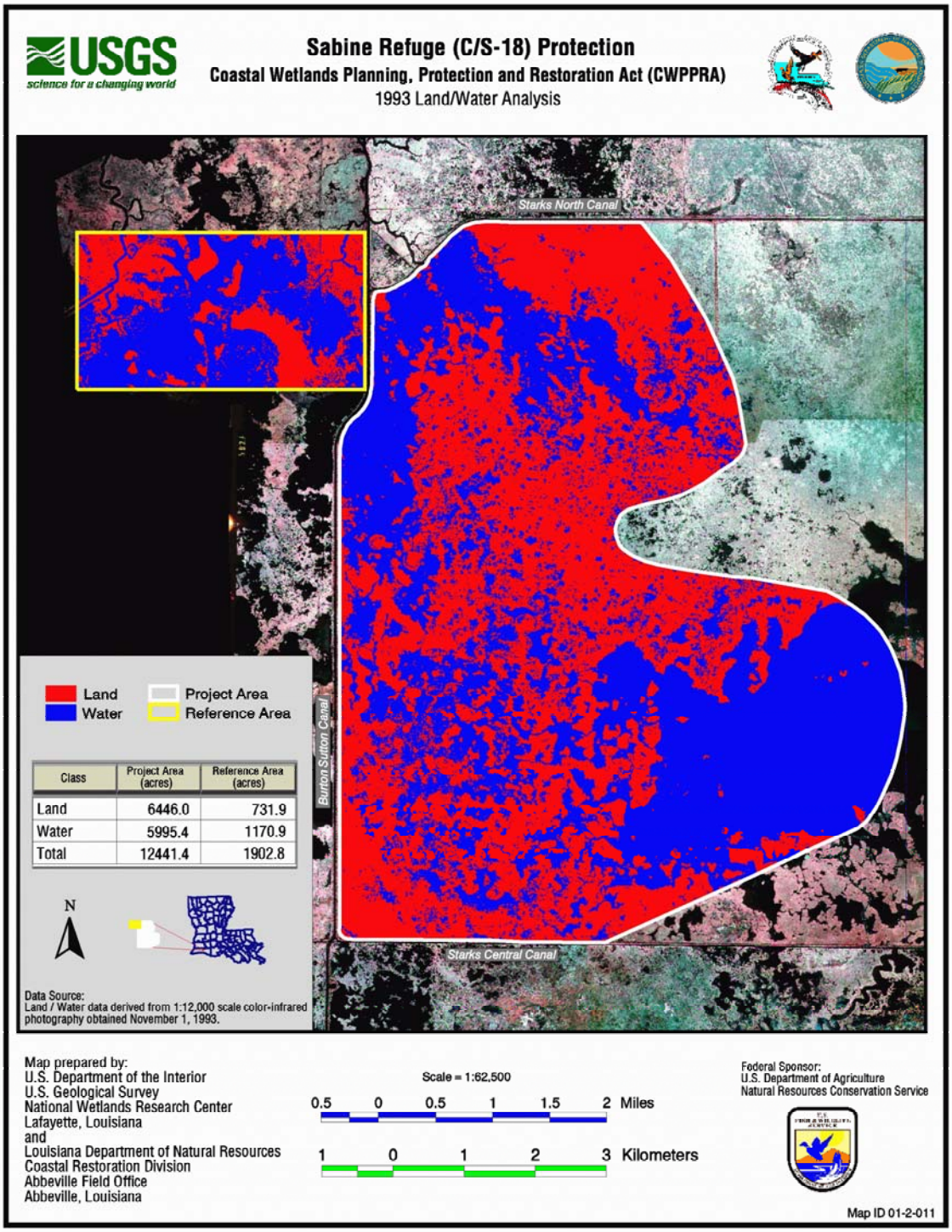

Figure 2. Sabine Refuge Protection (CS-18) GIS analysis of project and reference area pre-construction aerial photography (1993).

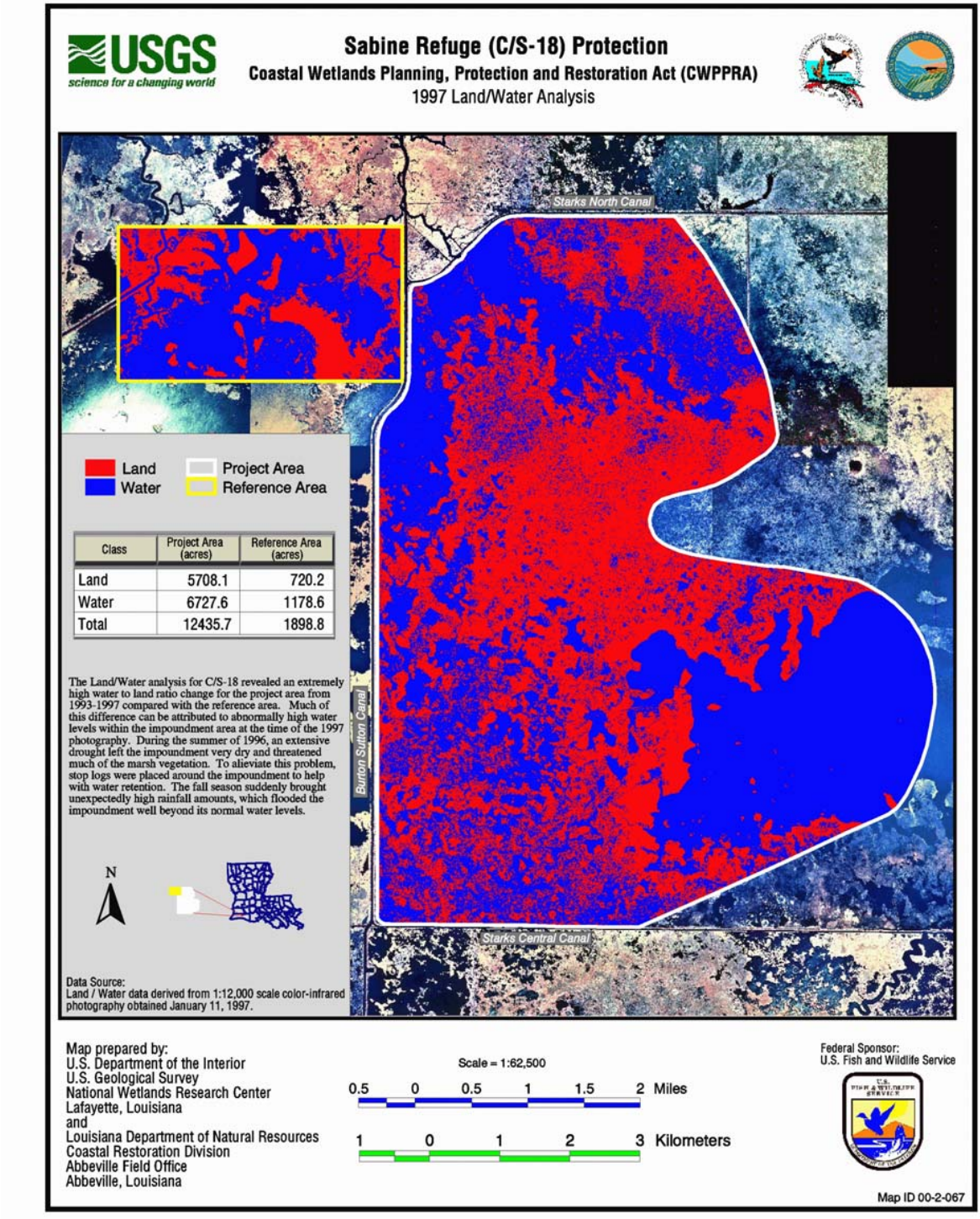

Figure 3. Sabine Refuge Protection (CS-18) GIS analysis of project and reference area post-construction aerial photography (1997).

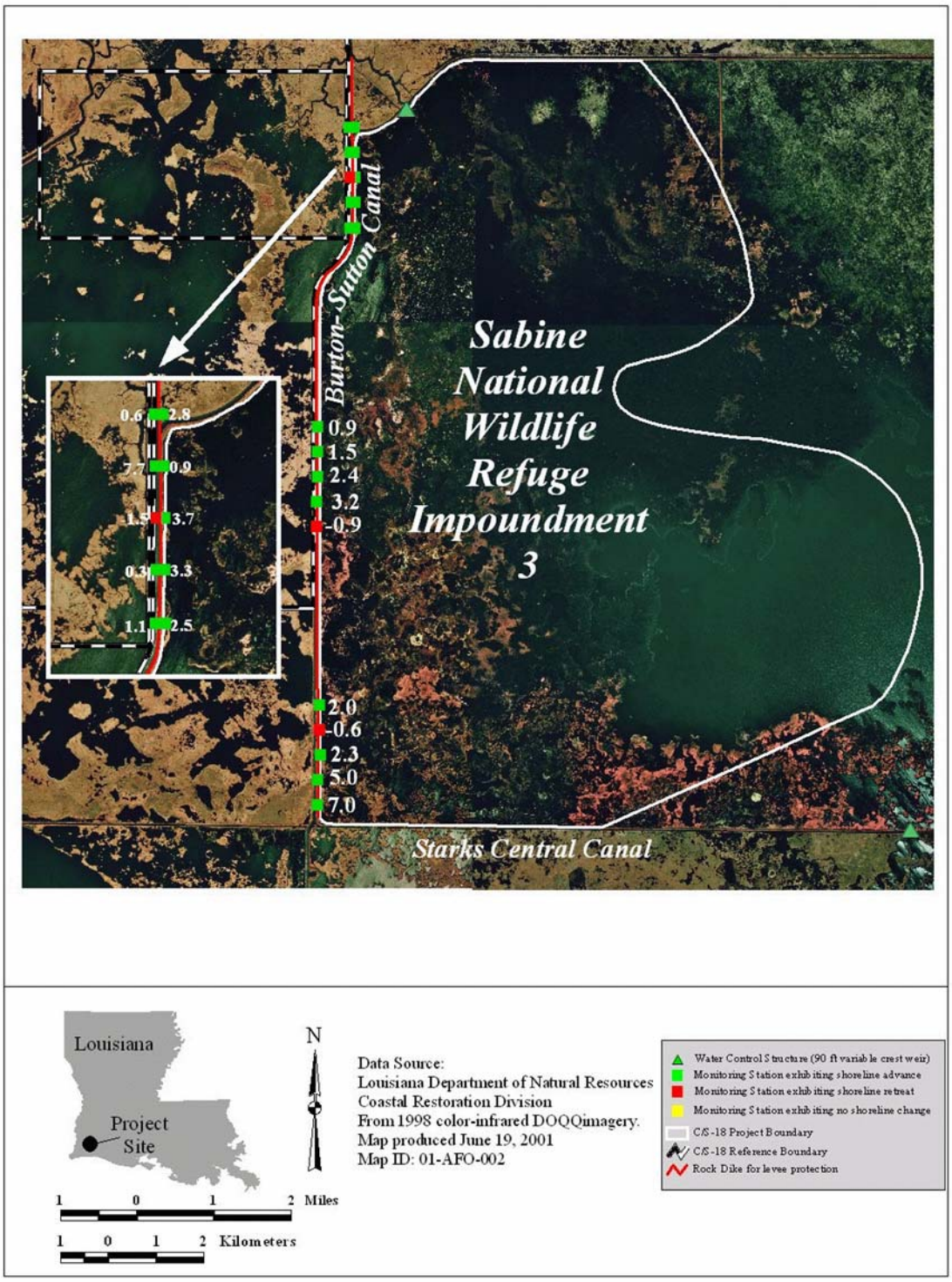

Figure 4. Sabine Refuge Protection (CS-18) shoreline change (ft) at project and reference area monitoring station locations between October 1995 and August 2000.

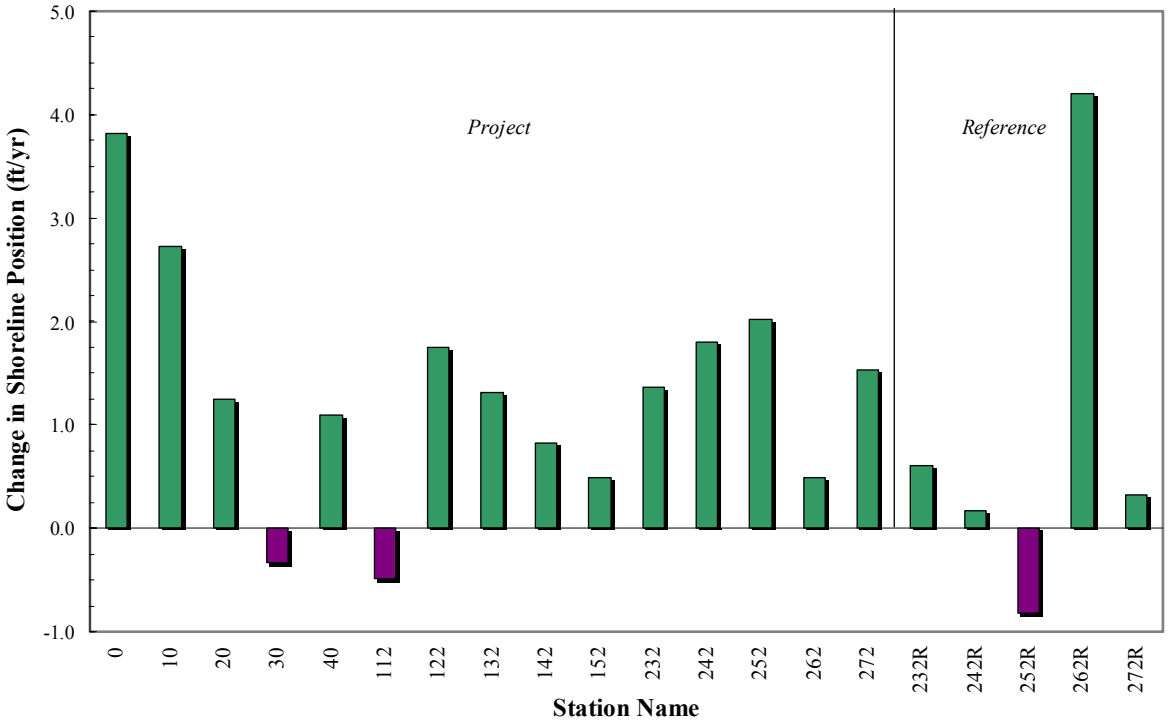

Figure 5. Sabine Refuge Protection (CS-18) shoreline change for the project and reference area from 1995 to 2000. Rates are calculated in ft/yr.

V. Conclusions

a. Project Effectiveness

The Sabine Refuge Protection project has been successful in stabilizing bank erosion of the west levee on the Burton-Sutton Canal (BSC), thus preventing land loss in Impoundment 3 on Sabine National Wildlife Refuge (SNWR). Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline. No additional shoreline data will be collected. Future inspections of the project area by CED engineers will be conducted at regular intervals to document the condition of the rock breakwater and the need for any required maintenance.

b. Recommended Improvements

There are no recommendations for this project.

c. Lessons Learned

The project has been effective at stopping shoreline erosion along the BSC and at preventing saltwater intrusion into the SNWR Impoundment 3. The BSC has not compromised the levee, and freshwater vegetation remains dominant in the impoundment.

IV. REFERENCES

Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF) and Wetlands Conservation and Restoration Authority 1998. Coast 2050: Toward a Sustainable Coastal Louisiana. Louisiana Department of Natural Resources, Baton Rouge, La. 161pp.

Sharp, L. A., and M. Guidry 2007. 2004 Operations, Maintenance and Monitoring Report for Sabine Refuge Protection Project (CS-18). Louisiana Department of Natural Resources, Coastal Restoration Division and Coastal Engineering Division, Baton Rouge, La.

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson 1995, revised 2000. Quality Management Plan for Coastal Wetlands Planning, Protection, and Restoration Act Monitoring Program. Open-file report no. 95-01. Department of Natural Resources, Coastal Restoration Division, Baton Rouge, La. 97 pp.

U.S. Fish and Wildlife Service (USFWS) 1991. Cameron Prairie National Wildlife Refuge Erosion Protection and Marsh Management Design Memorandum. U.S. Fish and Wildlife Service, Cameron Prairie National Wildlife Refuge, Gibbstown, La. 7 pp.

Appendix A
(Inspection Photographs)

Photo 1—southern tie-in on the Burton-Sutton Canal

Photo 2—northern tie-in

Photo 3—wingwall rock on Beach Canal structure

Photo 4—wingwall rock on Starks Central Canal structure

Appendix B
(Three-Year Budget Projection)
SABINE REFUGE SP / CS18 / PPL1
Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08

Project Manager	O & M Manager	Federal Sponsor	Prepared By
		FWS	

	2005/2006	2006/2007	2007/2008
Maintenance Inspection	$ 4,955.00	$ 5,119.00	$ 5,288.00
Structure Operation	$ -	$ -	$ -
Administration	$ -	$ -	$ -
Maintenance/Rehabilitation			

05/06 Description:

E&D	$ -
Construction	$ -
Construction Oversight	$ -
Sub Total - Maint. And Rehab.	$ -

06/07 Description

E&D	$ -
Construction	$ -
Construction Oversight	$ -
Sub Total - Maint. And Rehab.	$ -

07/08 Description:

E&D	$ -
Construction	$ -
Construction Oversight	$ -
Sub Total - Maint. And Rehab.	$ -

	2005/2006	2006/2007	2007/2008
Total O&M Budgets	**$ 4,955.00**	**$ 5,119.00**	**$ 5,288.00**

OPERATION AND MAINTENANCE BUDGET 07/01/2005-06/30/2006

SABINE REFUGE SHORELINE PROTECTION/CS-18/PPL1

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$4,955.00	**$4,955.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument		EACH	0	$0.00	$0.00
Staff Gauge / Recorders		EACH	0	$0.00	$0.00
Marsh Elevation / Topography		LUMP	0	$0.00	$0.00
TBM Installation		EACH	0	$0.00	$0.00
OTHER					$0.00
				TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings		EACH	0	$0.00	$0.00
OTHER					$0.00
				TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$4,955.00**

OPERATION AND MAINTENANCE BUDGET 07/01/2006-06/30/2007

SABINE REFUGE SHORELINE PROTECTION/CS-18/PPL1

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$5,119.00	**$5,119.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$5,119.00**

OPERATION AND MAINTENANCE BUDGET 07/01/2007-06/30/2008

SABINE REFUGE SHORELINE PROTECTION/CS-18/PPL1

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$5,288.00	**$5,288.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$5,288.00**

Appendix C
(Field Inspection Notes)

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:CS-18 Sabine National Wildlife Refuge

Date of Inspection: April 21, 2005 Time: 11:00 a.m.

Structure No. Impoundment Area 3

Inspector(s):Stan Aucoin, Dewey Billodeau, Darrell Pontiff

Structure Description: Rock Dike

Water Level Inside:N/A Outside: N/A

Type of Inspection: Annual

Weather Conditions: Sunny and Warm

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps					
Steel Grating					
Stop Logs					
Hardware					
Timber Piles					
Timber Wales					
Galv. Pile Caps					
Cables					
Signage /Supports					
Rip Rap Rock Dike W.W. Reinf.	 Good Good				
Earthen Embankment					

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?